115 26

# Kleen-Heet

## ARCHITECTURAL REFERENCE BOOK

heating

WINSLOW BOILER AND ENGINEERING COMPANY

208 SOUTH LA SALLE STREET, CHICAGO

[illegible]

# Kleen-Heet

# ARCHITECTURAL REFERENCE BOOK

*For Architects and Builders*

WINSLOW BOILER AND ENGINEERING COMPANY
208 SOUTH LA SALLE STREET, CHICAGO, ILL.

*This Memphis home is equipped to burn oil, the clean, modern fuel. No coal bins, no wasted basement space, only perfect* KLEEN-HEET

# INTRODUCTORY

IN presenting this reference book, it is not with the purpose of elaborating on the merits of KLEEN-HEET and of Winslow Industrial Burners, but to present briefly a few fundamental subjects, important in the heating industry, which are very often overlooked by manufacturers as well as by equipment distributors and contractors.

It has always been the aim of the Winslow Boiler and Engineering Company to not only create excellent mechanical equipment, but to have it distributed through the most efficient channels. During the years KLEEN-HEET has been on the market these principles of mechanical perfection and correct distribution and installation have been firmly instilled in the minds of the entire organization handling its product.

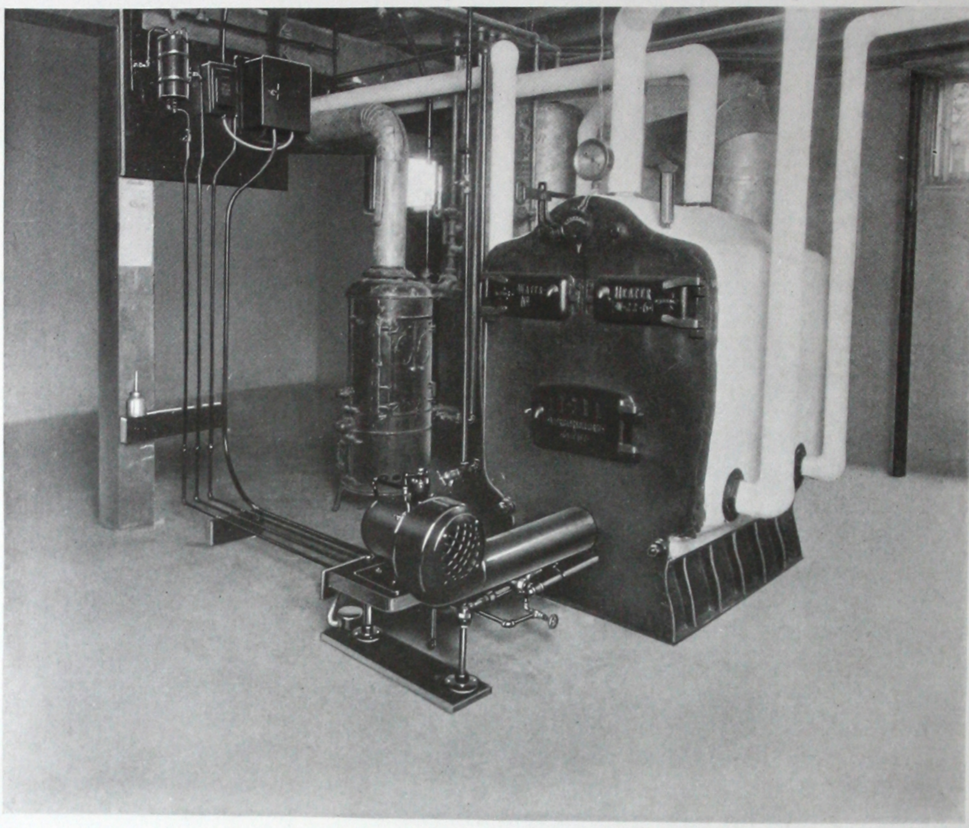
The problems which confront the fully automatic residential and apartment oil-burning equipment are distinctly different from those which confront the manually operated, non-automatic industrial burner. The types of boilers, methods of operation, character of suitable fuel and degree of attention to be given to the equipment are essentially different.

The engineering department of the Winslow Boiler and Engineering Company has produced two distinct kinds of oil-burning equipment.

One, the fully automatic KLEEN-HEET, is built in three types and thirteen sizes. These burners utilize the cheapest clean oil and are built as a package outfit for easy and simple installation. The famous KLEEN-HEET burner fire pot (with its efficient, vaporizing combustion) is an integral part of each burner.

The other, the *Winslow Industrial*, is "tailor-made" for each operation. This manually operated burner utilizes the fire-brick combustion chamber (which, when properly designed and *thoroughly heated*, aids in the combustion of the pre-heated fuel oil), the straight shot atomizing nozzle and pre-heating equipment so essential with fuel oil.

The specification form incorporated herein is one to which much study has been given. Where a doubt exists as to the correct KLEEN-HEET burner to be used, kindly get in touch with our executive offices or with your local KLEEN-HEET distributor.



KLEEN-HEET, *Type G, installed in a cast iron sectional boiler. The Stewart-Warner vacuum tank and Minneapolis controls are standard equipment*

# Fuel Comparisons

AT the usual calorific value of artificial gas, 550 B.T.U. per cubic foot, a rate for heating purposes as low as $1.00 per 1,000 cubic feet would mean a gross heat yield of 5,500 B. T. U. per 1c without allowing for boiler inefficiency.

36° Baumé gravity oil, such as we recommend for KLEEN-HEET, at 7½c per gallon of 138,421 B. T. U. means a gross heat yield per 1c of 18,456 B. T. U. Ratio of gas at $1.00 to oil at 7½c, 3.4 to 1 in favor of oil.

42° Baumé gravity kerosene at 11½c per gallon of 135,524 B. T. U. means a gross heat yield per 1c of 11,785 B. T. U. Ratio of gas at $1.00 to kerosene at 11½c, 2 to 1 in favor of kerosene.

Natural gas usually has a heat value of about 1,000 B. T. U. per cubic foot which at the rate of 60c per 1,000 would give a heat yield per 1c of 16,666 B. T. U.

Natural gas is confined to limited fields and the fields are continually diminishing. Most such districts have found that when extremely low temperatures are reached that the gas gives out, sometimes entirely, so that other fuels have to be resorted to.

Anthracite coal with approximately 14,000 B. T. U. per pound and at $19.00 per ton delivered, has a gross heat yield of 14,737 B. T. U. per 1c. While gas and oil gross heat values are subject to a discount due to boiler efficiency, anthracite coal is subject to an additional discount due to ash, moisture, unburned coal and heat required to create a draft.

Bituminous coal has an extremely great range of heat values. Low grades sometimes have only 6,000 B. T. U. per pound while the best grades run as high as anthracite. In this type of fuel the owner is, as a rule, at a distinct disadvantage in realizing what he is getting for his money.

All coals, but most especially the bituminous, contain varying percentages of fixed carbon, combustible and non-combustible gases, moisture and ash. The moisture and the non-combustible gases naturally do not create any heat but on the other hand they absorb heat that otherwise could be utilized profitably. The ash constitutes a part of the coal for which payment is made but gives no return and by its clinkering retards the proper burning of the balance of the coal. It is not an infrequent occurrence for an ash pile to show nearly 10% unburned coal.

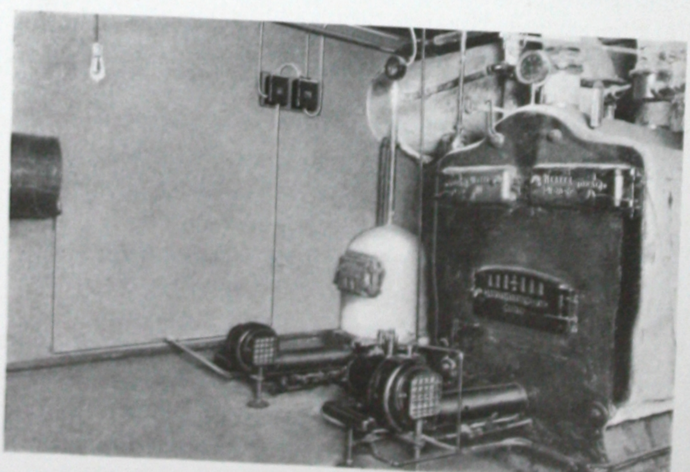
Discount the apparent gross heat yield of coal by the above detrimental factors and it is clear that the actual quantity of heat liberated in a boiler, with its own deficiency to further reduce the net heat yield, is problematical.

In oil burning the buyer can know absolutely what he is paying for in B. T. U. value. The boiler efficiency is the only practical detriment to a full realization of the heat value of the fuel.

## Combustion

COMBUSTION is simply a chemical union of oxygen and carbon. Correct combustion converts the two components into a gas having two parts of oxygen for each part of carbon. This is Carbon-dioxide or $CO_2$. Where combustion is imperfect another gas is formed in which only one part of oxygen mixes with one part of carbon. This is Carbon-monoxide or CO. Its presence in the flue gases means incomplete combustion.

The flue gases are indicative of combustion but care must be exercised to insure an absolutely tight boiler setting, for even slight leakages in between the sections of a cast iron boiler, through fire or clean-out doors, cracks, etc., will greatly reduce the $CO_2$ percentages by diluting the gases.



*The St. John Cantius Church and two of the many burners used in this modern religious educational institution. A Winslow Industrial handles two Kewanee down draft boilers and the following* KLEEN-HEET *burners are used:*

*One No. 6*
*One No. 10*
*One No. 13*
*One No. 19*
*Two No. 56*

Approximately 80% of air is composed of an inert gas, nitrogen. This gas remains unaffected by the chemical actions during combustion and it is exhausted out through the stack along with the various gases produced during the process of combustion. The other 20% of the air is oxygen.

If the fuel were pure carbon and the mixture of each unit of carbon was thorough and uniform with two corresponding parts of oxygen there would be only nitrogen and $CO_2$ in the flue gases.

However, we never secure fuel that is all carbon and even the best fuel burning equipment will not give absolutely perfect combustion. Oils contain about 86% free carbon, 12% hydrogen and traces of moisture, oxygen and sulphur. Each of these components requires a different and yet a definite amount of oxygen for combustion. Since the oxygen comprises only about one-fifth of the air it is easily seen that immense quantities of air must be provided for the satisfaction, in a chemical way, of all these elements. This vast supply of air carries with it a very large volume of the useless nitrogen which, however, swells the volume of gases to be carried away by the flue. Since the proportions of the various gases in the flue are measured in percentages by volume it is apparent that the more air supplied the greater the nitrogen content and the smaller the proportion of each combustion gas to the entire volume.

Each pound of carbon requires 11.52 pounds of dry air for combustion. Each pound of hydrogen requires three times as much air or 34.56 pounds while each pound of sulphur requires only 4.32 pounds.

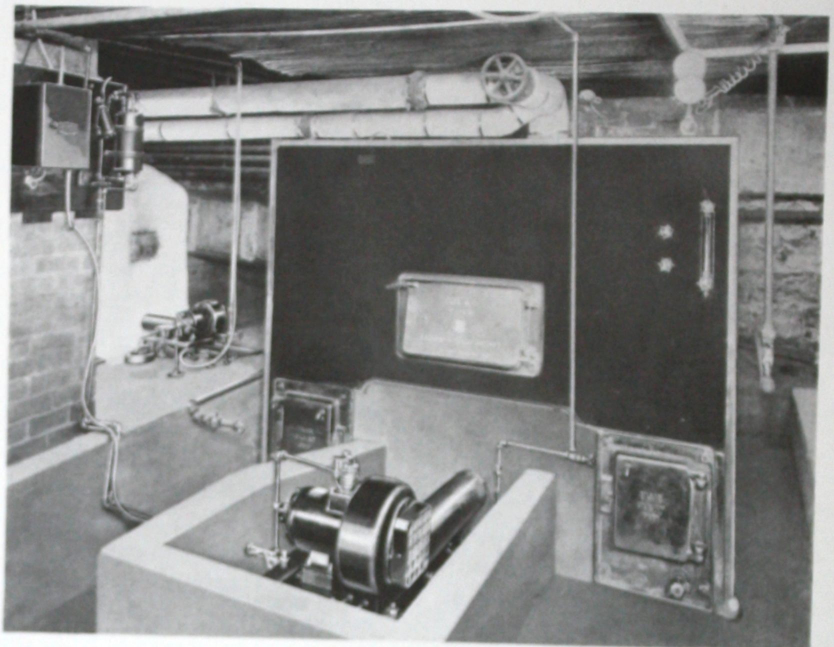
In actual practice more air is introduced than that technically required. Whereas in coal burning 100% and even 200% excess air is supplied, the excess in oil burning should not exceed much more than 40%.

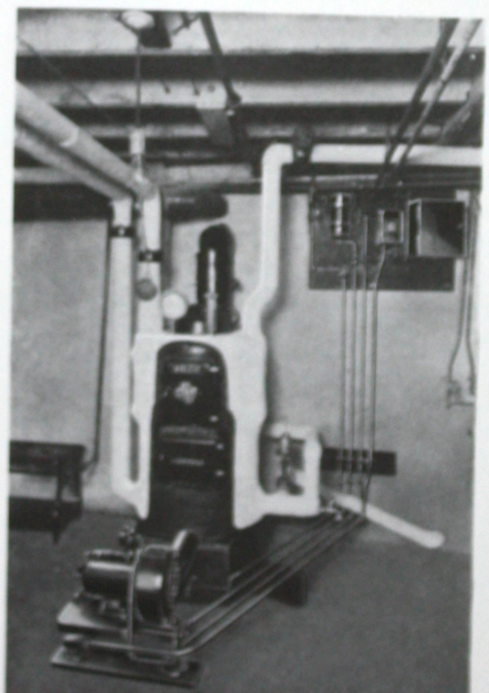
Because of the high hydrogen content of oil, the $CO_2$ in the flue gases will not usually equal the percentages attained in good coal firing.

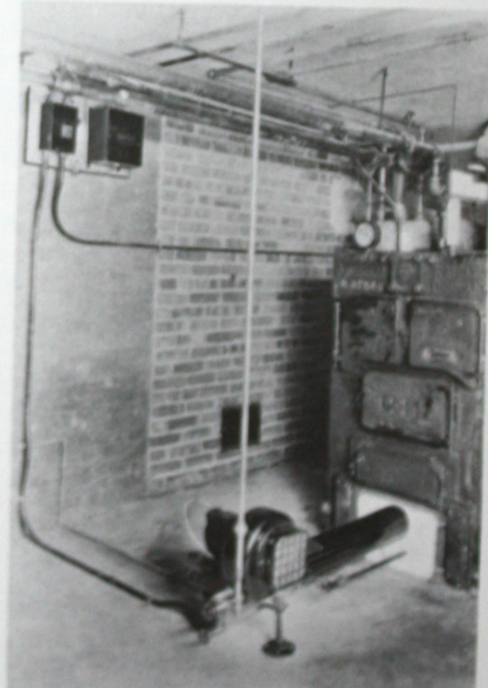
In large industrial plants oil burners operate for long periods of time. Since non-automatic equipment is desirable it is customary to use atomizing, straight-shot nozzles which project a stream of fire into the boiler.

This fire must be intercepted by a fire brick target wall, not only to protect the boiler from injury but, *when thoroughly heated*, to aid in the combustion of the heavy fuel oil. Until this fire brick is heated combustion efficiency will, of course, be considerably sub-normal. Pre-heating equipment for bringing the fuel oil up to a temperature conducive to efficiency, and to insure fluidity, is required.

In fully-automatic residential work efficient oil combustion demands a more suitable medium than fire brick construction because the intermittent flame rarely brings the fire brick to the efficiency temperature and because the brick work requires scientific and perfect design as to shape and size to suit each boiler. Many house heating boilers have fire pots too small to permit the decrease in volume naturally incidental to the introduction of







fire brick. Furthermore oils more suitable than fuel oil are required, not only from the standpoint of simplicity of mechanism but of market accessibility.

S. O. Andros in *Fuel Oil in Industry* says: "The fundamental principle of burning oil successfully is combining the proper proportion of oxygen, with the proper proportion of oil. In order that the combustible shall unite with the oxygen and obtain complete combustion, a high temperature is necessary if the flame is injected into the open fire-box of the domestic furnace with its intermittent firing. The flow of heat from the flame to the air contained in the fire-box, and to the walls of the fire-box, reduces the temperature of the flame, resulting in incomplete combustion and a great waste of fuel. It is necessary, therefore, to have some other agency than the fire-box to attain a high temperature quickly where intermittent firing is required. The oil and the air should be confined together in a combustion chamber at a high temperature so that the union of the oil and the oxygen shall be complete and so that combustion will be rapid. Without such a combustion chamber, the combustible in the oil and the oxygen in the air will not unite thoroughly and will not burn to $CO_2$ but will burn only to CO with a resultant escape of heat units up the chimney."

## Boiler Adaptability

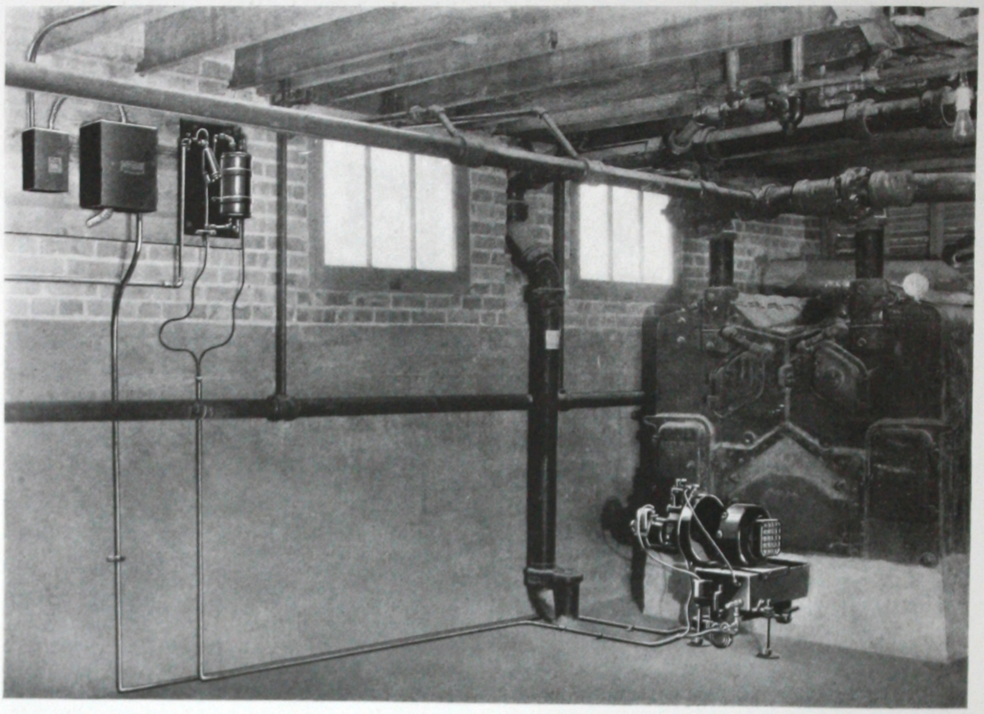
A STUDY of thousands of residential heating plants in which KLEEN-HEET is used, discloses the fact that there are literally more than a hundred and fifty different styles, types and makes of boilers and furnaces. Naturally there is a great variation in efficiency. Some are adapted to soft coal but can be made efficient for other fuels. Some are already well adapted to hard coal and to oil but are using soft coal with very poor results.

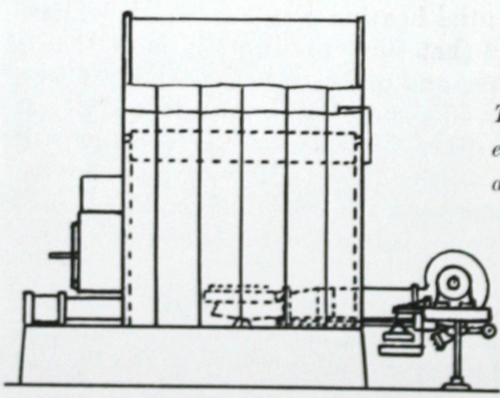
The ability of a boiler to absorb heat from the fire and from its gases of combustion before entry into the chimney is in a great measure indicative of its efficiency.

The main essentials in boiler design are grate area, fire pot capacity, direct heating surfaces, indirect (or flue) heating surfaces and the position of the uptakes that carry the heated gases of combustion from the fire pot up into the flues.

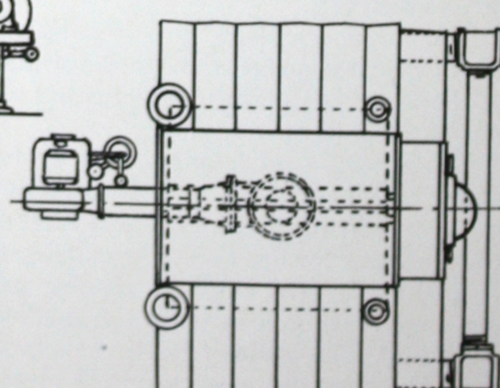
Bituminous coal requires large grate areas and ample fire pots because of the bulkiness of the coal. It can only utilize a relatively small amount of indirect heating surface because of the additional draft requirements and the tendency toward excessive soot deposits, except in smokeless type boilers.

Anthracite coal employs smaller grates and smaller fire pots because more coal can be utilized in the smaller volume due to the compactness of hard coal. The indirect heating surfaces can be very effectively increased since the fires and gases are both cleaner and hotter.





*The photograph above and the plan and elevation below show* KLEEN-HEET'S *adaptation to the magazine-feed type boiler*



Oil fuel dispenses with the grates, requires a boiler fire pot of just sufficient capacity to insure a completion of combustion and gives a very high fire temperature which demands, for the highest efficiency, as long a travel of the gases as practically possible.

It will thus be readily seen that a boiler that has proved inadequate with Bituminous coal may be large enough if Anthracite or Oil is used while a boiler too small using either kind of coal may be large enough with Oil.

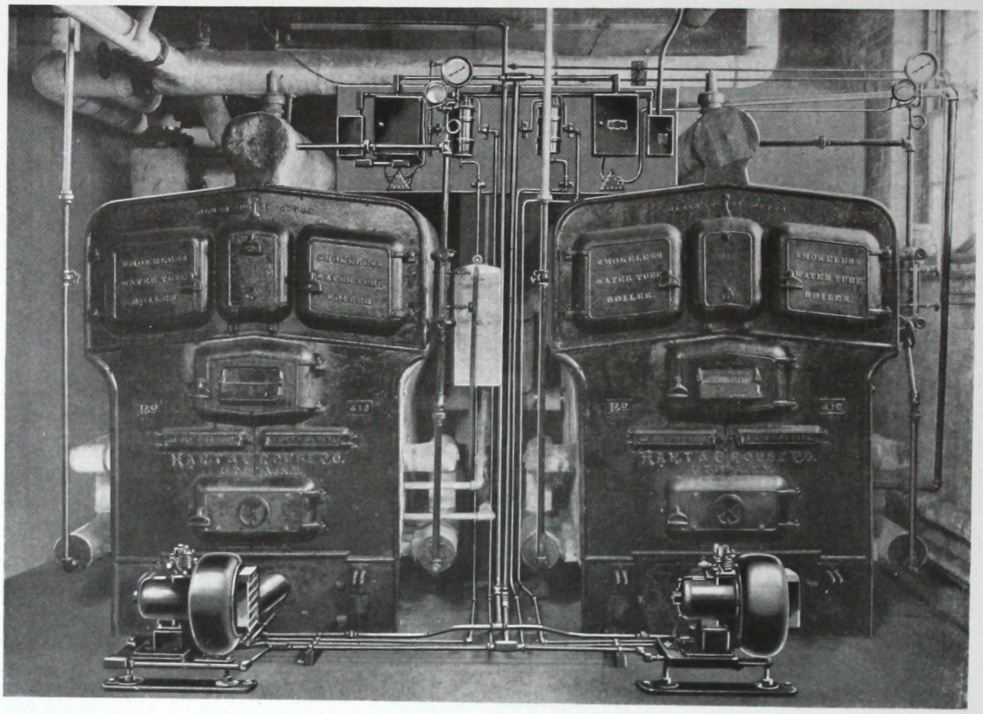
In studying the many types of boilers, the character and extent of the indirect heating surfaces and the location of the gas uptakes into the flues should be especially noted.

Horizontal heating surfaces absorb heat more readily than do vertical surfaces. The heat naturally rises to the under side of a horizontal surface and spreads in all directions beneath it. Heat tends to slide upwards past a vertical surface. A lighted candle with its tip of flame placed first two inches to one side of a vertical sheet of paper and then held two inches below the same sheet (held horizontally) will clearly illustrate this point.

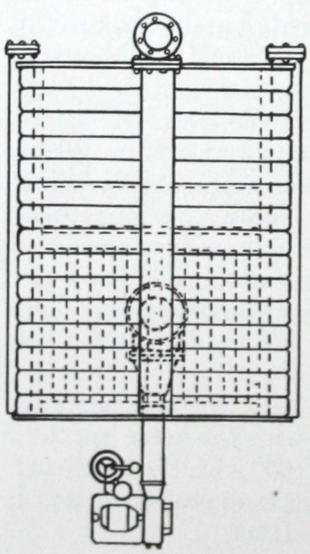
The uptakes leading from the fire pot into the flues should be so placed as to retain the heat in the fire pot as long as possible, and to deliver the heated gases into the flues at a point as far from the boiler exit into the smoke hood as possible.

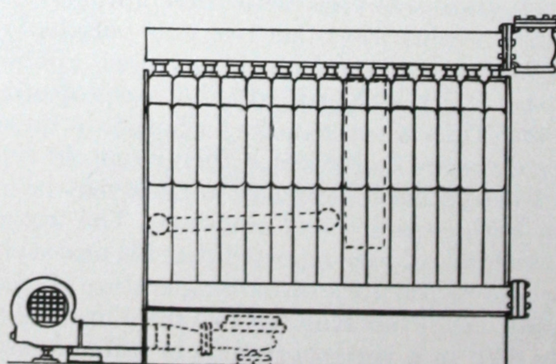
Where there is an excess of uptake area the efficiency can be often improved by blocking the uptakes nearest to the smoke hood thus increasing the fire pot heat retention and compelling the gases to travel a longer distance over water-backed surfaces. This baffling of uptakes is dependent on the extent to which the boiler back pressure is increased.

Ordinary sectional cast iron boilers have a variety of arrangements of the indirect heating surfaces. Care should be exercised in making a careful survey based on the above suggestions. The gradual change of householders from Anthracite to Bituminous coals is well emphasized by the change made in the construction of a certain boiler by one of the larger manufacturers. In 1908 a sectional boiler with seven sections and a twenty-two inch grate was built with three uptakes into the flues, one of these being full size while the other two were only half size. The sootier, more gaseous soft coal that later became so general, compelled the makers to market the same boiler with one extra full sized opening and one extra half sized uptake. Thus when installing a burner in these particular boilers care should be exercised to see if it is the new or old type. If it is a modern boiler the extra uptakes required by soft coal may be blocked off with a great increase in both capacity and efficiency. The writer recalls one such instance in which a coal user reported that his new style boiler with the extra uptakes would not create a water temperature of more than 160° with the best hard coal. After blocking the two front uptakes the water temperature jumped to 200° in a very short time in spite of sub-zero weather.




*The photograph above and the plan and elevation below show* Kleen-Heet's *adaptation to the down-draft type boiler*





Round cast iron boilers are very popular in residential heating. These boilers as a rule have several different capacities for each grate diameter. The larger capacities being secured by the addition of flat, slab-like water sections (with staggered gas uptakes) above the fire pot.

Usually there are four such different sizes. The smallest having a fire pot section and dome; the next having a fire pot, single intermediate section and dome; the third having a fire pot, a double intermediate section and dome; the largest having a fire pot, a single intermediate section, a double intermediate section and a dome.

The two smaller sizes are really intended for soft coal. In oil or hard coal usage they should be increased in height by the addition of sections. Where this is impossible due to boiler room height the oil fired boiler of this type can usually be improved by removing the asbestos jacket, wire-brushing the exterior of the boiler and enclosing it in a brick setting with the walls about three inches away from the boiler. The smoke hood should be changed from the usual position on top to a location in the brick setting near the floor so that the heated gases will pass over the outer walls of the boiler thus increasing the direct heating surface of the boiler. The draft must be very ample when this procedure is followed.

This question of boiler efficiency and adaptability is very important and plays a most prominent part in fuel consumption. Where the other factors that determine fuel requirement are equal a variation in boilers will result in a corresponding variation in fuel demand.

## Draft

A STUDY of draft conditions is essential to good heating design regardless of the fuel contemplated. The fact that an oil burner can be so adjusted that it will have only a slight haze emitting from the chimney has led some oil burner salesmen to make extraordinary claims regarding chimney requirements.

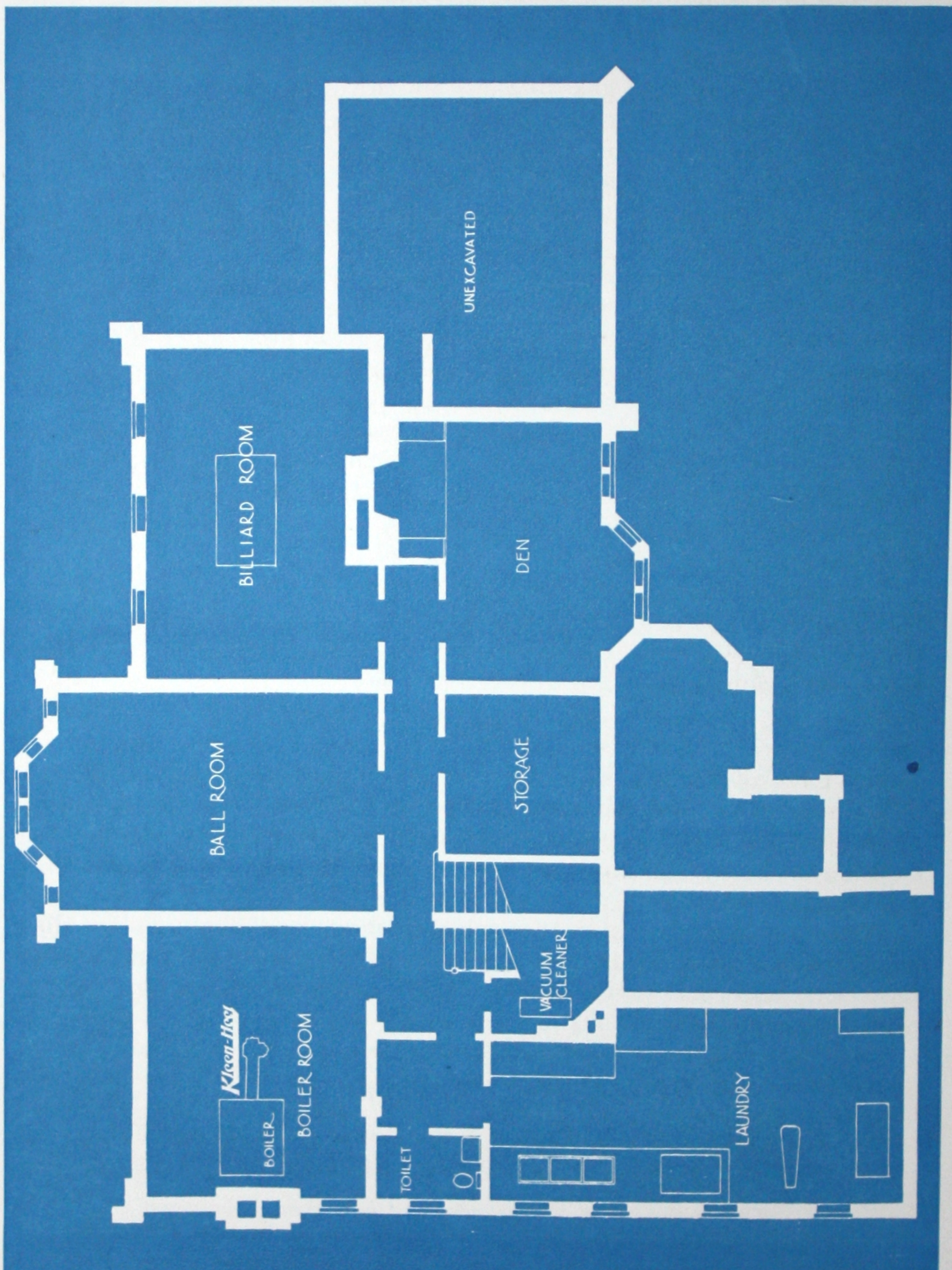
A chimney is more vital to the success of any type of heating plant than even the fuel itself, as its function is to carry off the gases of combustion after they have performed their duties and have yielded their heat units to the heating medium in the boiler.

### *The Oil Burner and the Home*

*THE modern automatic oil burner is of particular interest to architects, because of the opportunity it gives for perfect utilization of the basement.*

*This modern fuel permits the isolation of the mechanical equipment of the home into a single room in one corner of the basement.*

*The cuts in this book show one architect's handling of basement opportunity since the advent of the modern fuel.*


UNEXCAVATED
BILLIARD ROOM
DEN
BALL ROOM
STORAGE
VACUUM CLEANER
Kleen-Heet
BOILER ROOM
BOILER
TOILET
LAUNDRY

All boiler manufacturing companies agree that most apparent boiler troubles are nothing more or less than chimney troubles. The boiler companies are so imbued with the importance of this subject, that practically every catalogue specifies the minimum chimney which is to be utilized in conjunction with each boiler they manufacture as well as cautions for general guidance in studying chimney conditions. An observation of various catalogues shows that a round boiler with a 22-inch diameter grate, which would be used on the average five-room bungalow in a climate such as Chicago, requires a chimney whose dimensions are 8″ x 12″ inside. A 28″ diameter round boiler requires a chimney whose inside measurement is 12″ x 12″.

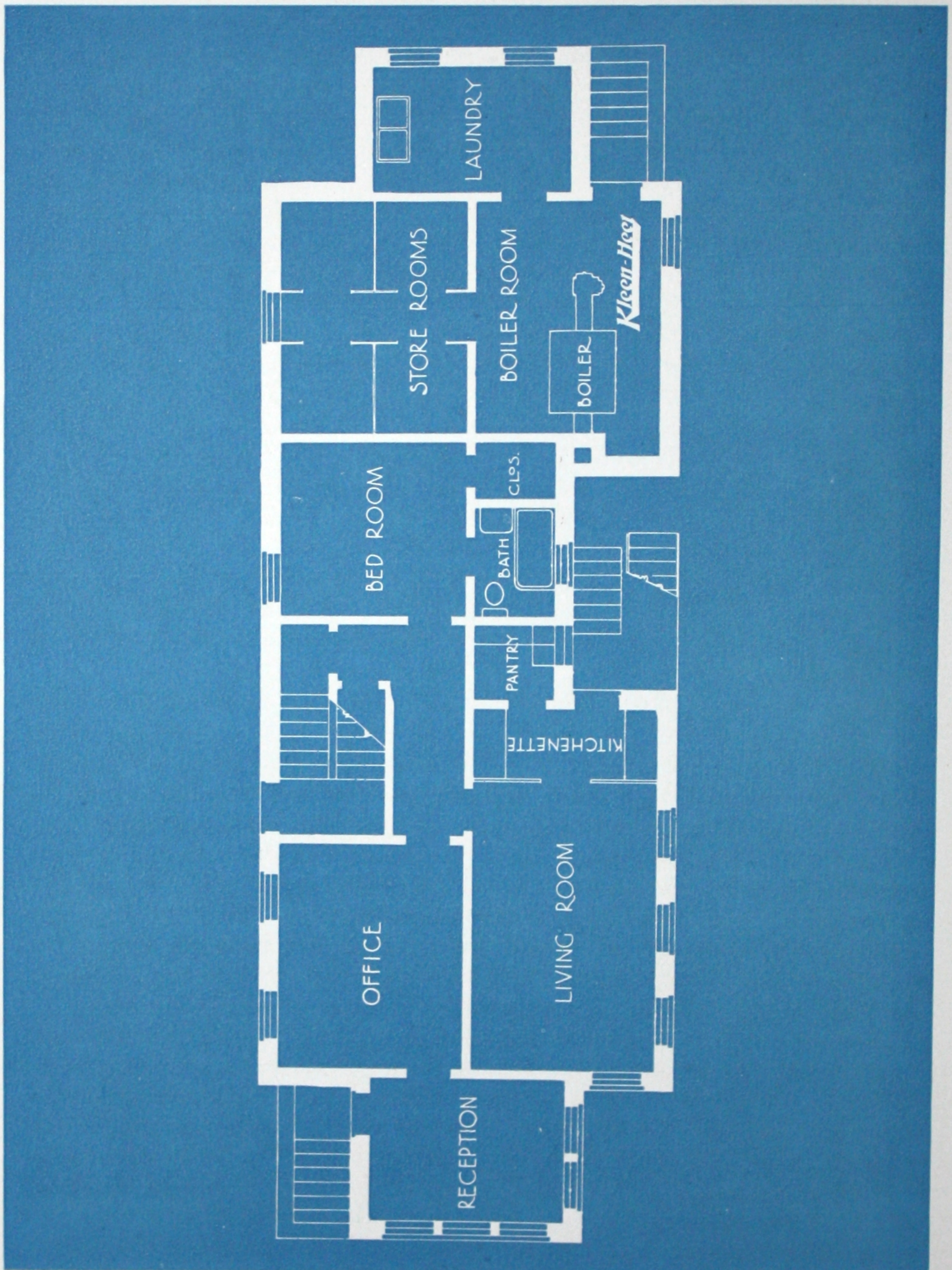
Many mistakes are made in connecting boilers to chimneys; for instance, it sometimes happens that the lever controlling mechanism supplied with sectional boilers (in which a rod runs over the top of a boiler with instructions, "Pull to open damper") is assembled reversed. As a result when the rod is pulled forward, instead of the damper being "open" it is "shut." Such simple mistakes have resulted in material dissatisfaction on the part of an owner of a boiler, when as a matter of fact, it was purely carelessness on the part of the steamfitters.

Another mistake which is frequently made, is to shove the smoke pipe from the boiler or sleeve so far into the chimney opening that it nearly hits the opposite inner wall of the chimney and as a result prevents the chimney from realizing its proper area.

Frequently the sleeve which is inserted in the brick work and into which the smoke pipe of the boiler should slip is very loosely connected into the lining of the chimney proper, with the result that there are back currents of air from out of the chimney into the space between the lining and the brick chimney itself. Such back currents are very harmful to draft.

It is not at all unusual to discover clean-out doors in the base of a chimney wide open or entirely omitted with a resulting impediment to draft. In some instances the mortar between the brick has fallen out so that a candle passed along the wall of the chimney will have its flame sucked into these openings. Every one of these small apertures reduces the chimney draft and a very few will entirely kill the effectiveness of the chimney.

Whenever dirt, dust or soot escapes up into a house from a heating plant, regardless of fuel, immediate attention should be given the smoke pipe and chimney. If a damper is shut too far, it will result in a back pressure in the boiler and leakage of gases into the boiler room. The connection of the smoke pipe into the chimney should be investigated. While the smoke pipe is being inspected, a mirror passed into the chimney will enable an examination of the chimney from top to bottom. The condition of the sleeve in the chimney opening itself should be examined. The question of height is not so important in an oil burning heating plant, but where the chimney


LAUNDRY
STORE ROOMS
BOILER ROOM
BOILER
Kleen-Heet
BED ROOM
CLOS.
BATH
PANTRY
KITCHENETTE
OFFICE
LIVING ROOM
RECEPTION

is near a building which might result in a heavy down-draft, attention should be given.

Where there is an excellent draft, it is permissible to leave a damper in the smoke pipe provided the damper is of the locking type, with no possibility of the adjustment of the damper changing itself. Ordinary pivot dampers which simply depend upon a spring or their own weight to hold in position should be avoided as the damper could very easily shut clear off and result in back pressure.

The question as to other heaters using the same flue has been discussed from time to time, and it is now a standard specification that the heating plant smoke pipe connect into an individual flue.

## Weather and Fuel

THE great difficulty of accurately measuring coal after delivery into the basement has resulted in a general misconception on the part of a majority of home owners as to how and when the coal is burned. They thoughtlessly divide the seasonal tonnage by the number of months in the heating season and from then on think of the matter in terms of three or four tons of coal per month.

The ease with which monthly oil deliveries and balances can be checked results in a very careful observation, by the new oil burner user, of monthly, weekly, and even daily oil consumption.

The fact that January demands nearly four times as much fuel as does October comes as a great surprise.

### *Oil Fuel*

Baumé Gravity: A measure of its weight, based upon specific gravity.

$$\text{Baumé Gravity} = \frac{140}{\text{Specific gravity}} - 130$$

Viscosity: A measure of fluidity. Very important in residential oil burning equipment where pre-heaters are not available.

Flash Point: Temperature of the oil at which a lighted taper passed over the oil will produce momentary ignition of oil vapors.

End Point: The temperature, in the process of distillation, at which distillation is completed.

Cold Test: The temperature below which the oil congeals.

Heat Value: Ranges from 18,810 B. T. U. per pound at 14° Baumé gravity to 19,690 B. T. U. per pound at 36° Baumé gravity.

*This Kleen-Heet-ed Grand Rapids home is assured healthful, uniform temperatures throughout the heating season, regardless of fluctuating weather conditions*

A heating plant is designed to maintain a standard temperature, usually 70°, in the home regardless of the temperature prevailing outdoors. Naturally, the lower the outdoor temperature is the greater the work the heating plant is called upon to do.

The heating deficiency that the fuel must offset is the difference between 70° and the average outdoor temperature multiplied by the number of days in the period under consideration.

The ratio of the heat deficiency of any one month to the sum of the heat deficiencies of all the months in the heating season represents the percentage that month bears to the season.

Monthly fuel consumption varies in direct proportion to the heat deficiencies.

$$HDm = (70° - MTm)\ Dm \qquad HDs = (70° - MTs)\ Ds$$

$$MF\% = \frac{HDm}{HDs} = \frac{HDm}{\text{sum of } HDm} = \frac{(70° - MTm)\ Dm}{(70° - MTs)\ Ds}$$

in which:

HDm = Heat deficiency for the month
MTm = Mean temperature for the month
Dm = Days in the month
HDs = Heat deficiency season
MTs = Mean temperature season
Ds = Days in heating season
MF% = Monthly fuel demand in %

# Oil Burner Specifications

GENERAL: This contractor is to furnish and install a complete KLEEN-HEET oil burner outfit in accordance with the following specifications:

BOILER: The heating boiler is a No. made by the Company. It has a cataloged rating of square feet of water (steam) (vapor) radiation and will, on this job, carry a net load of square feet of water (steam) (vapor) radiation. The grate is round (or square) and measures ". The domestic water heating plant consists of a gallon water storage tank and a No. domestic water heater made by the Company. It has a round (or square) grate measuring ".

BURNERS: Furnish and install in the heating boiler one No. KLEEN-HEET burner, manufactured by the Winslow Boiler and Engineering Company.

Furnish and install in the domestic water heater one No. KLEEN-HEET burner, manufactured by the Winslow Boiler and Engineering Company.

Introduce burner through base front frame of boiler to selected position. Support front end of burner on a pier of fire-brick just back of the burner fire-pot. Adjust legs so that burner is level both from right to left and from front to rear. Insert felt pads under rear legs before final adjustment. Saw off the excess legs above top locknuts.

Build a fire brick wall just inside the thin ash pit shell of boilers that do not have the water-backed surfaces extending down to the floor.

Brick in the boiler front base around the air duct, using fire-brick and a 50-50 mixture of asbestos and Portland cement. When nearly dry moisten trowel and give cement smooth, even finish. When thoroughly dry paint cement a flat black.

CHIMNEY: Cement around the junction of the smoke pipe and chimney. Touch up any leaks in the chimney. Putty all leaks in the boiler setting. See that smoke pipe enters chimney correct distance. Cement all around smoke pipe inside brick work. Use only locking-type dampers.

Another contract provides for an individual flue for each burner, each flue full size, gas tight and without offsets or other obstructions.

VACUUM TANK: Mount a neat, wooden "vacuum tank and relay box" panel on solid basement wall near boiler. Base of vacuum tank should be about five feet above floor.

PIPING: Run ¼-inch galvanized oil line from bottom tapping of vacuum tank to the magnetic valve or to the gate valve on Type E. In installation of the Type GJ, the vacuum tank is omitted and a service tank substituted.

Run a ¼-inch galvanized air-line from the air suction tapping on the vacuum tank to the suction outlet on the motor pump unit. Follow straight lines in all piping and keep at least six inches above the floor, so as to facilitate sweeping.

Reduce the ½-inch suction line from the main outside oil tank where it enters the building to ¼-inch, install ¼-inch union and swing check valve, run a ¼-inch galvanized line from the check valve to the oil tapping on the vacuum tank.

Use only new, galvanized fittings and be sure that all threads are clean-cut, sharp and deep. Every joint must be oil tight. Use thick orange shellac or litharge and boiled oil on male thread only. All unions must be of the ground seat type.

WIRING: Mount Minneapolis relay in box on "vacuum tank and relay box" panel. Run two No. 12 wires in BX or conduit from the distribution box to an entrance switch near relay box. This must be a separate circuit. Run two No. 12 wires in BX or conduit from the entrance switch to the terminals marked "Line" in the relay box. Use standard BX connectors at the entrance to the box.

Run two No. 12 wires in BX or conduit

from the relay box terminal marked "Motor" to the cut-out box of the burner. Keep this line close to the oil and air-lines.

Thermostat: Install Minneapolis thermostat (equipped with thermometer) in a central room. Select a position on an inside wall, remote from hot or cold pipes, windows, doors, etc. Run the low voltage thermostat cable from the thermostat to the relay box in boiler room. Observe color scheme of thermostat, relay box and cable in making connections.

Hydrostat: On a hot water heating system use the Minneapolis hydrostat, locating its bulb either in a top boiler tapping, or in a main riser as it leaves the boiler. Bulb must be in circulating water. Run low voltage thermostat cable from hydrostat terminals to relay box, observing color scheme in connections.

Pressurestat: On steam or vapor system install the boiler control with a goose neck or patent trap to keep water out. Use either the Minneapolis with its thermostat cable connection to the relay, or a Mercoid interposed in the 110 volt line to the burner motor.

Guarantee: This contractor shall guarantee (1) the burner to be free from defects in workmanship or materials for a period of one year from date of installation and (2) that the burner installed under these specifications will deliver water temperature or steam pressure equal to that which coal delivers in the same boiler.

Final: This contractor shall see that the installation is in strict accordance with these specifications and shall thoroughly explain the equipment to the owner or his representative.

### Oil Tank

On all tank installations observe local ordinances.

(*For outside buried tank use the following*)

Furnish and bury at point selected a -gallon tank, made of 3-16″ steel. Tank to be painted one coat of rust-resisting paint.

Locate tank at least five feet from the nearest main supporting basement wall or two feet where there is no basement.

Excavate so that there will be at least 24 inches of dirt above top of tank when ground has settled to a level. Mound up the dirt at least 6 inches to allow for settling.

Run ½-inch suction line from top of tank down to within 1 inch of bottom of tank. Use street ells in swinging joint on top to allow for slight settling of tank. Run ½-inch suction line from tank into house, follow most direct line and keep piping at least 12 inches under ground.

Where fill pipe can be directly above tank use a 2½-inch combination vent and fill cap for venting, gauging and filling. Fill cap should be at least 6 inches above ground.

If fill pipe is to run to a remote filling point use 2-inch pipe, galvanized, and terminating in an ordinary locking cap. A perforated, locking cap should be put directly above tank for gauging and venting.

See that bottom of tank excavation is level. Lower tank carefully, using ropes securely anchored and keep taut around heavy stakes. Do not drop tank into hole.

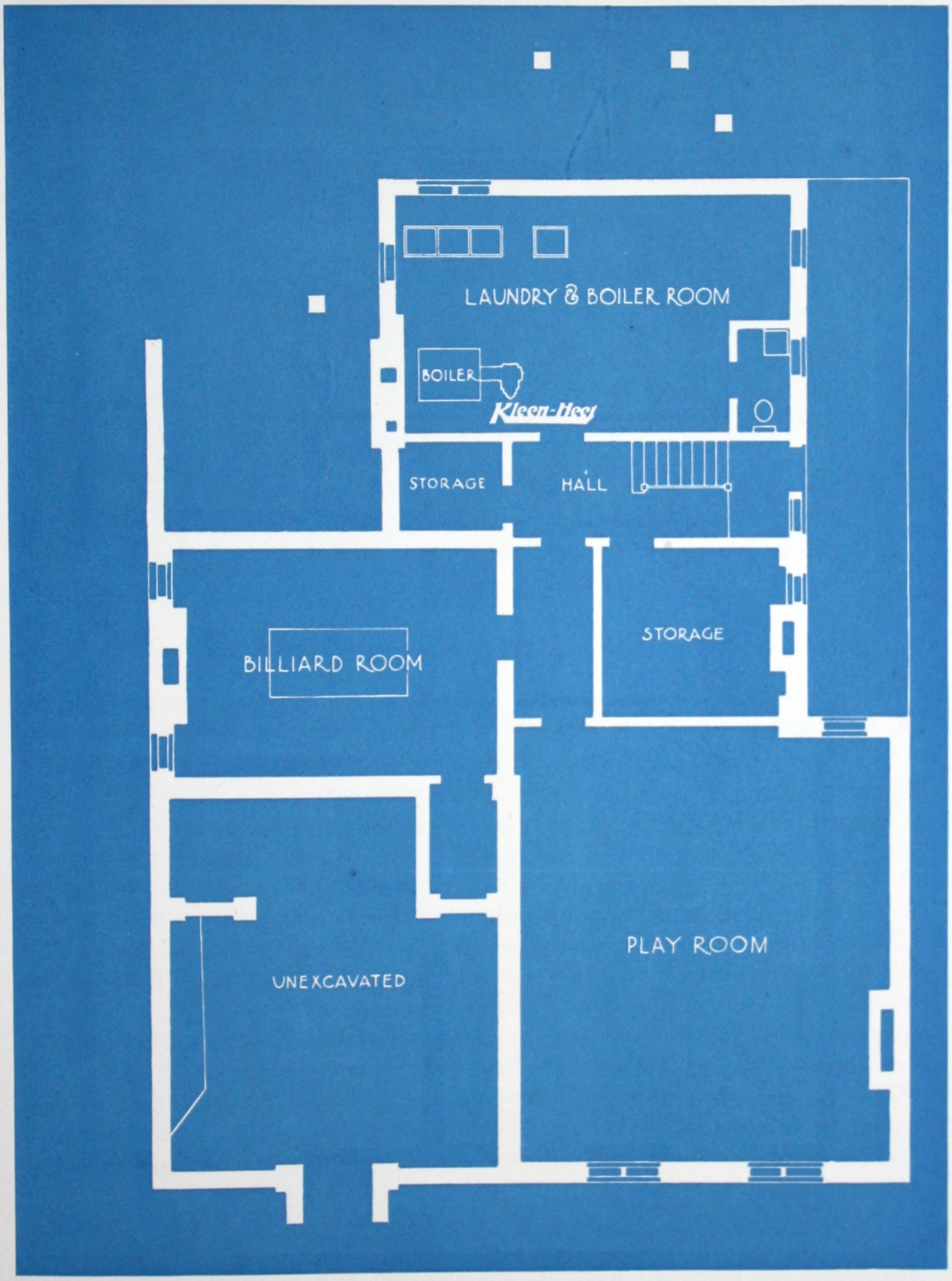
(If owner does not want any pipe sticking up above the level of the ground sink a 12-inch tile or casting into ground with tight-fitting flush cover. Cap and pipe can terminate in this box below ground level and be free from water danger.)

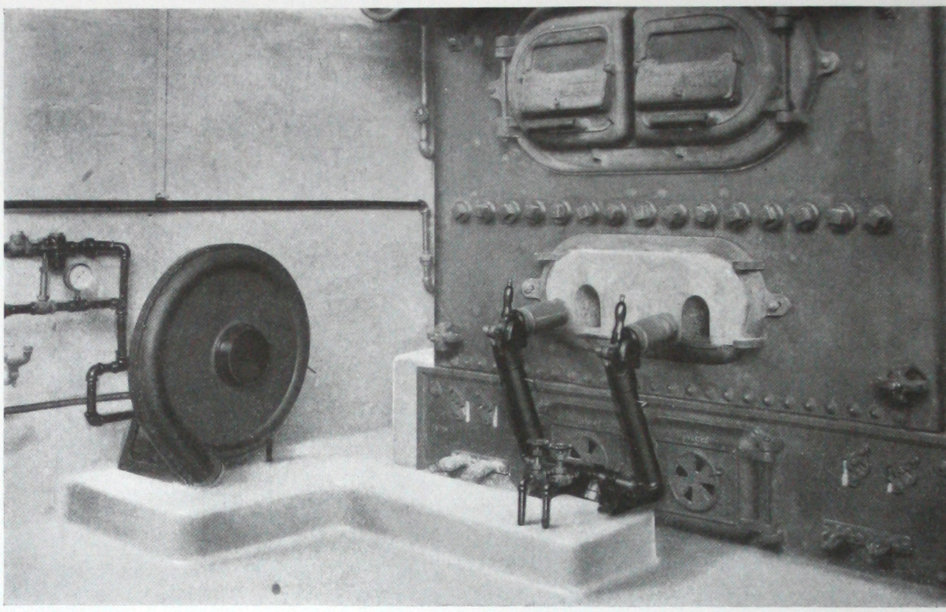
(*For inside tank use the following*)

Furnish and install in basement at least ten feet from boiler a -gallon 12 gauge black steel tank, mounted on heavy sills. Run 2″ oil fill pipe from fill tapping to convenient outdoor terminal. Furnish cap and lock.

Run ½″ vent line from tapping on tank to an outdoor point at least three feet higher than fill cap. Use close return bend on terminal of vent line with open tapping looking down.

Run ¼-inch suction line from a point about 1″ above bottom of tank to oil tapping of vacuum tank, inserting a swing check valve just above storage tank. With the GJ burner, oil line will run from base of tank direct to burner.


LAUNDRY & BOILER ROOM
BOILER
Kleen-Heet
STORAGE
HALL
STORAGE
BILLIARD ROOM
PLAY ROOM
UNEXCAVATED



# Winslow Industrial Burners

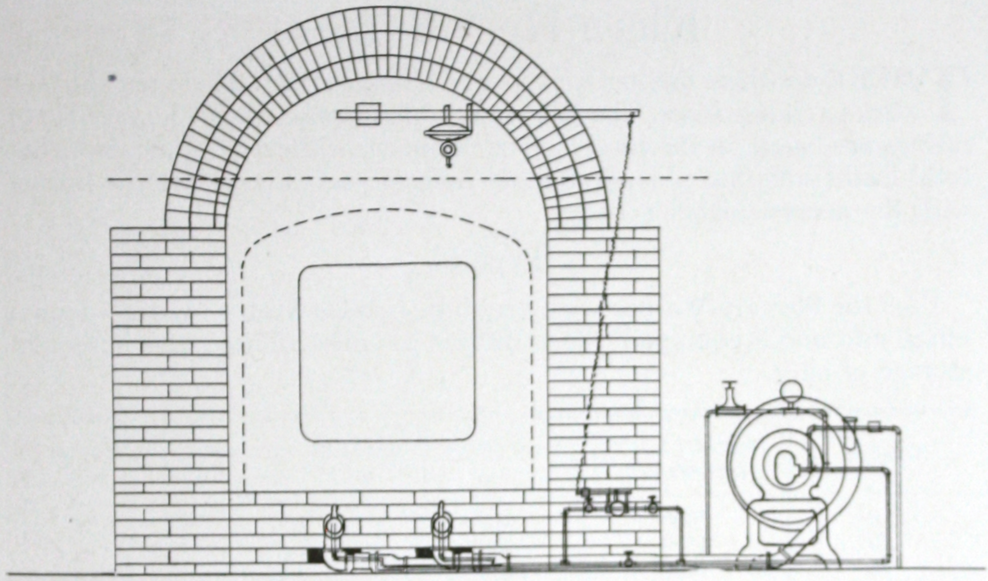
THE *photograph* above and the layout on the *opposite* page, illustrate the application of our Winslow Industrial burner to Down Draft and to Fire Box boilers. Each motor blower pump unit can handle from one to fifteen burners. Any oil from 14° Baumé up is suitable.

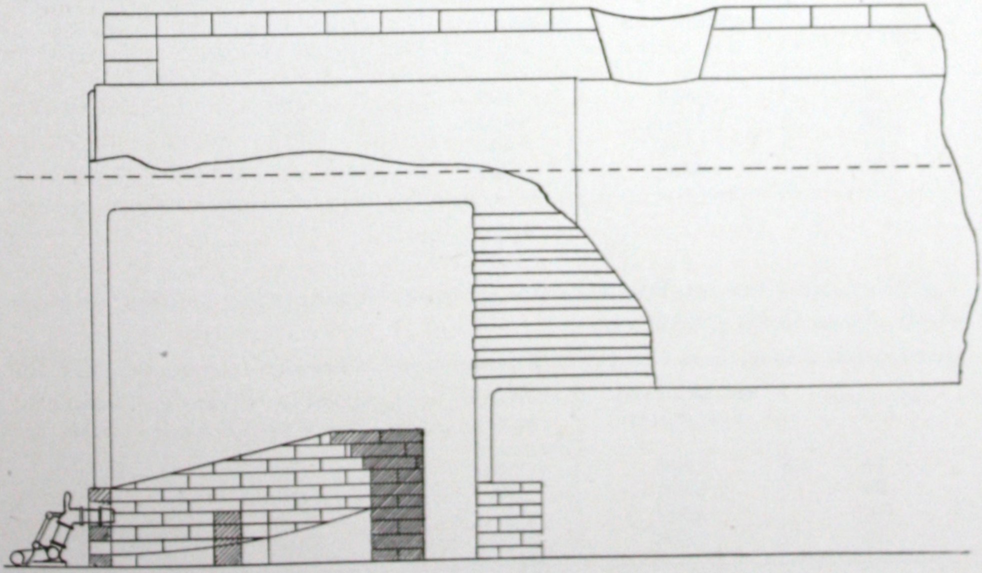
The engineering department of the Industrial Division is always ready to co-operate in the correct application of these burners. The necessary fuel oil heaters, pressure regulating valves, properly proportioned combustion chambers and all installation details will be carefully laid out by experts.

The Winslow Burner is manufactured for distribution throughout the eastern and mid-western territory under the Turbine Fuel Oil Burner Company patents. The Fess System Company of San Francisco manufactures similar equipment for the territory in which they operate under the same patents of the Turbine Fuel Oil Burner Company.

This equipment has been in universal use for twenty-five years. For the largest high pressure plants the blower unit is driven by a steam turbine thereby reducing the operating cost—using the electric motor only for starting purposes.

The construction of this equipment makes it quieter than is ordinarily found in burners of the same capacity—and the excellent atomization and other exclusive features eliminate the need of an attendant.





# Kleen-Heet Burners

THERE are three distinctive types of KLEEN-HEET. There are thirteen sizes to choose from. The following tables explain them. KLEEN-HEET ratings are based on the total load each burner will carry. Calculate that total load [radiation plus piping and boiler losses] and select the burner with the nearest higher rating.

## Type G

Uses the Stewart-Warner vacuum tank, Janette Motor-blower-vacuum pump unit and is equipped with a Bunsen gas pilot. Eliminates basement storage of oil.

| NUMBER | SQUARE FEET HOT WATER | RADIATION STEAM | GALLONS OF WATER 70° TO 160° IN 1 HOUR | MOTOR SIZE |
|---|---|---|---|---|
| 8 | 1000 | 625 | 200 | 1/8 |
| 13 | 1400 | 850 | 280 | 1/8 |
| 19 | 2000 | 1250 | 400 | 1/8 |
| 56 | 5600 | 3500 | 1000 | 1/4 |
| 80 | 8000 | 5000 | 1680 | 1/2 |

## Type GJ

Eliminates the vacuum tank and vacuum pump and permits the use of a basement service tank. Equipped with Bunsen gas pilot.

| NUMBER | SQUARE FEET HOT WATER | RADIATION STEAM | GALLONS OF WATER 70° TO 160° IN 1 HOUR | MOTOR SIZE |
|---|---|---|---|---|
| 6 | 600 | 300 | 120 | 1-20 |
| 10 | 1000 | 625 | 200 | 1/8 |
| 15 | 1400 | 850 | 280 | 1/8 |
| 21 | 2000 | 1250 | 400 | 1/8 |

## Type E

Utilizes the Stewart-Warner vacuum tank, eliminating basement storage of oil. Uses electric ignition.

| NUMBER | SQUARE FEET HOT WATER | RADIATION STEAM | GALLONS OF WATER 70° TO 160° IN 1 HOUR | MOTOR SIZE |
|---|---|---|---|---|
| 14 | 1400 | 850 | 280 | 1/6 |
| 20 | 2000 | 1250 | 400 | 1/6 |
| 50 | 5000 | 3100 | 1000 | 1/4 |
| 75 | 7500 | 4500 | 1500 | 1/2 |



FORM NO. 70. PRINTED IN U. S. A.